Vision, Identification, with Z-sensing Technologies and key Applications

OPTICAL 3D IMAGING SENSORS

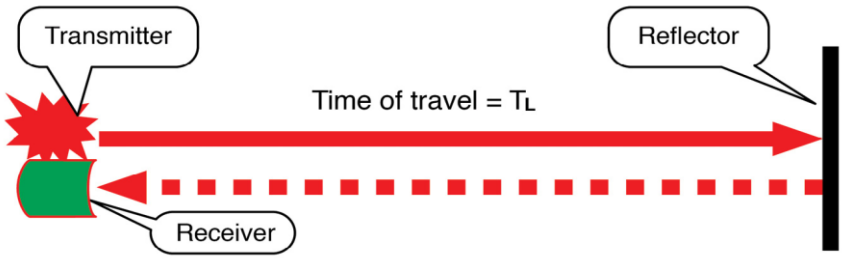
What is the topic about?

Optical 3D imaging sensors are solid-state components using similar technologies than Integrated Circuits (ICs) such as CMOS process used for most of micro-processors.

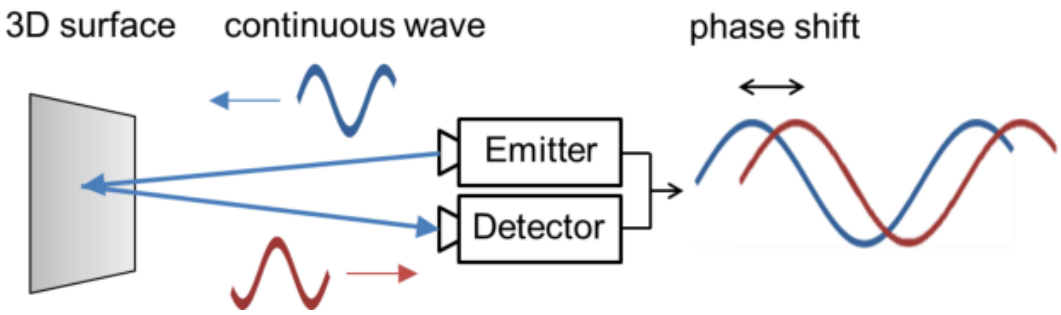
The specificity of these ICs is their ability to "see" ambient scenes in the 3 Dimensions like we are used to do with our 2 eyes and the little help of our brain.

Similarly, 3D imaging can be obtained by combining 2 classical 2D cameras, we call this technique stereoscopic vision.

3D Imaging sensing can nowadays be directly performed by a single optical sensor combined with an IR source with Direct Time of Flight and Indirect Time of Flight techniques described hereafter.



Direct Time of Flight technique (source LIDAR magazine)



Indirect Time of Flight technique (source researchgate.net)

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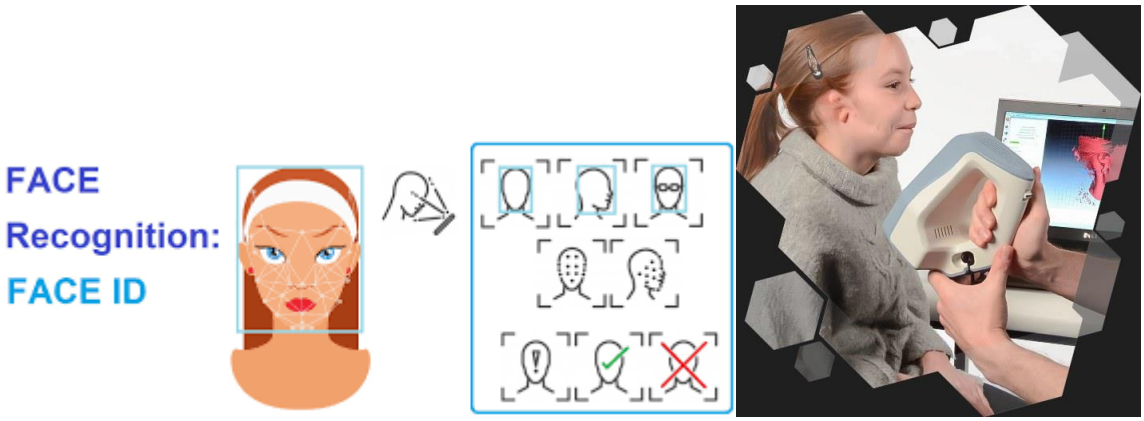
3D Optical imaging sensors can be described as “super camera” which integrates in a few tens of mm2 Silicon die many optical (micro-lenses, filters, photo-detectors) and electronics (amplification, digitalization, image processing) functions.

What are the main applications?

There are numerous applications ranging from widely used mobile phones secured access by user face identification to specialized scientific and medical systems where accurate digital representation of the environment is needed to allow computed help.



Applications examples (source left: medium.com and right: artec3d.com)

The applications, in terms of Optical 3D sensing, need several characteristics to combine in products/components:

- Sensitivity with different ambient light conditions
- Resolution in X, Y, Image Quality
- Range of distance (Z) and accuracy of detection
- Speed, Field of View
- Low Power consumption, size, price, weight
- Firmware support and applicative development tools
- Interfacing ability with overall system

Which are the current limits of the technology?

Some target characteristics of Optical 3D sensing solutions are antinomic and require some trade-offs associated to different sensor products for different application segments.

One of the most challenging problem is to provide an economically competitive solution at final application level. This needs not only to develop innovative Silicon processes and efficient circuit architectures but also to think to the whole system. Optimization of the global 3D vision solution is key to achieve competitive advantage by considering the sensor and all the system around the sensor.

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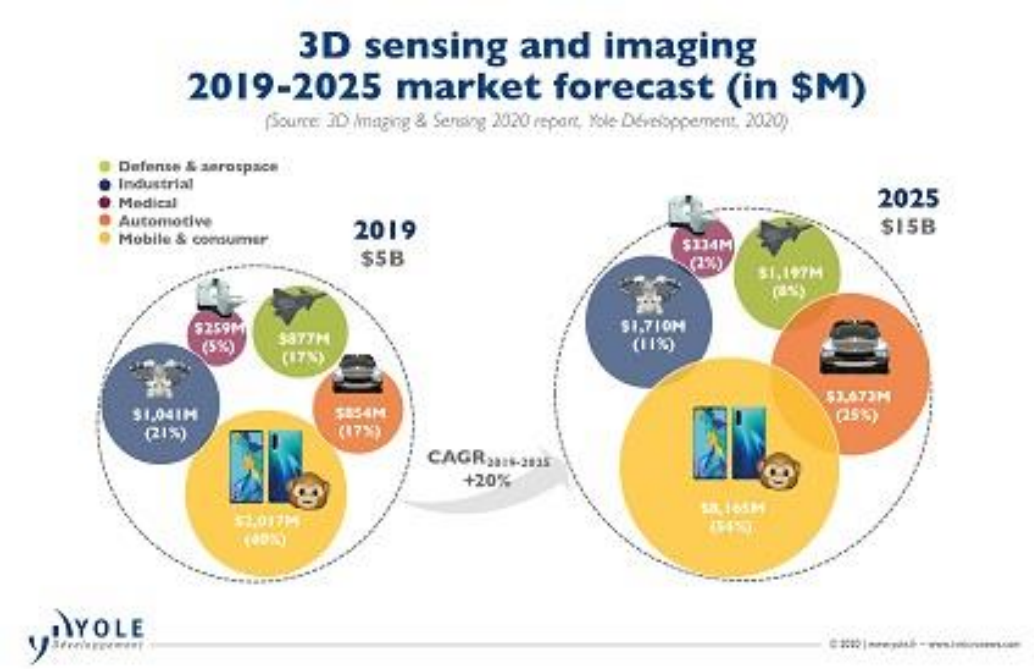
What solution is VIZTA bringing?

VIZTA project brings together the industry number1 World-wide in Time of Flight sensors (STMicroelectronics) and many European leaders in various applications fields or technologies developments.

Such a team force enables to define, develop and demonstrate, innovative solutions using the latest Optical 3D sensor prototypes based on new silicon and non-silicon processes manufactured in Europe.

VIZTA gathers intentionally the complete value chain from equipment tools to products and service providers so that the demonstrators developed within the project can rapidly support a successful industrial deployment.



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